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Publication date:
2011

Document Version
Final published version

Harvest Strategy for Aerial Parts Affects the Content of Alkamides in Roots of *Echinacea purpurea*

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Keywords: *Echinacea purpurea*, immune system, chromatography electrospray

Abstract

Echinacea purpurea are widely used for the unspecific enhancement of the immune system. The plant originates from North America and is now grown all over the world as garden flower and/or as a medicinal plant. Alkamides are believed to be among the active metabolites in *E. purpurea*, with the highest concentrations being present in the roots. Most investigations on roots have been conducted, on plants younger than one or two growing seasons and the effect of harvest of the aerial parts (herbal harvest) on the content of alkamides in roots of *E. purpurea* have, to the best of our knowledge, not been investigated before. Aerial parts (top 20 cm with flowers, stem and leaves) of 4-year old *E. purpurea* plants were harvested before, under and after flowering. Roots were then harvested one week, three weeks and three months after herbal harvest, respectively. Alkamides were extracted from milled freeze dried roots with ethanol–water (70:30) and identified by liquid chromatography electrospray ionization ion-trap mass spectrometry (LC–ESI–IT–MS/MS) combined with photodiode array detection (PAD) and quantified in extracts by reverse phase HPLC–PAD. Major alkamides in roots were identified as undeca-2*Z*,4*E*-diene-8,10-diynoic acid isobutylamide, dodeca-2*E*,4*E*,8*Z*,10*Z*-tetraenoic acid isobutylamide and dodeca-2*E*,4*E*,8*Z*,10*E*-tetraenoic acid isobutylamide. The results show that later harvest of aerial parts (harvest after flowering) results in an overall higher concentration of alkamides in roots compared to early harvest of aerials parts (harvest before flowering). Moreover, the concentration of alkamides in roots of *E. purpurea* is highest shortly after harvest of aerial parts, and the alkamide concentration is hereafter decreasing with time. In order to acquire highest content of alkamides in roots, harvest of aerial parts should be done after flowering and the roots should be harvested shortly afterwards.

ROYAL FLORA
RATCHAPHRUEK
2011

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DECEMBER 15 – 18, 2011
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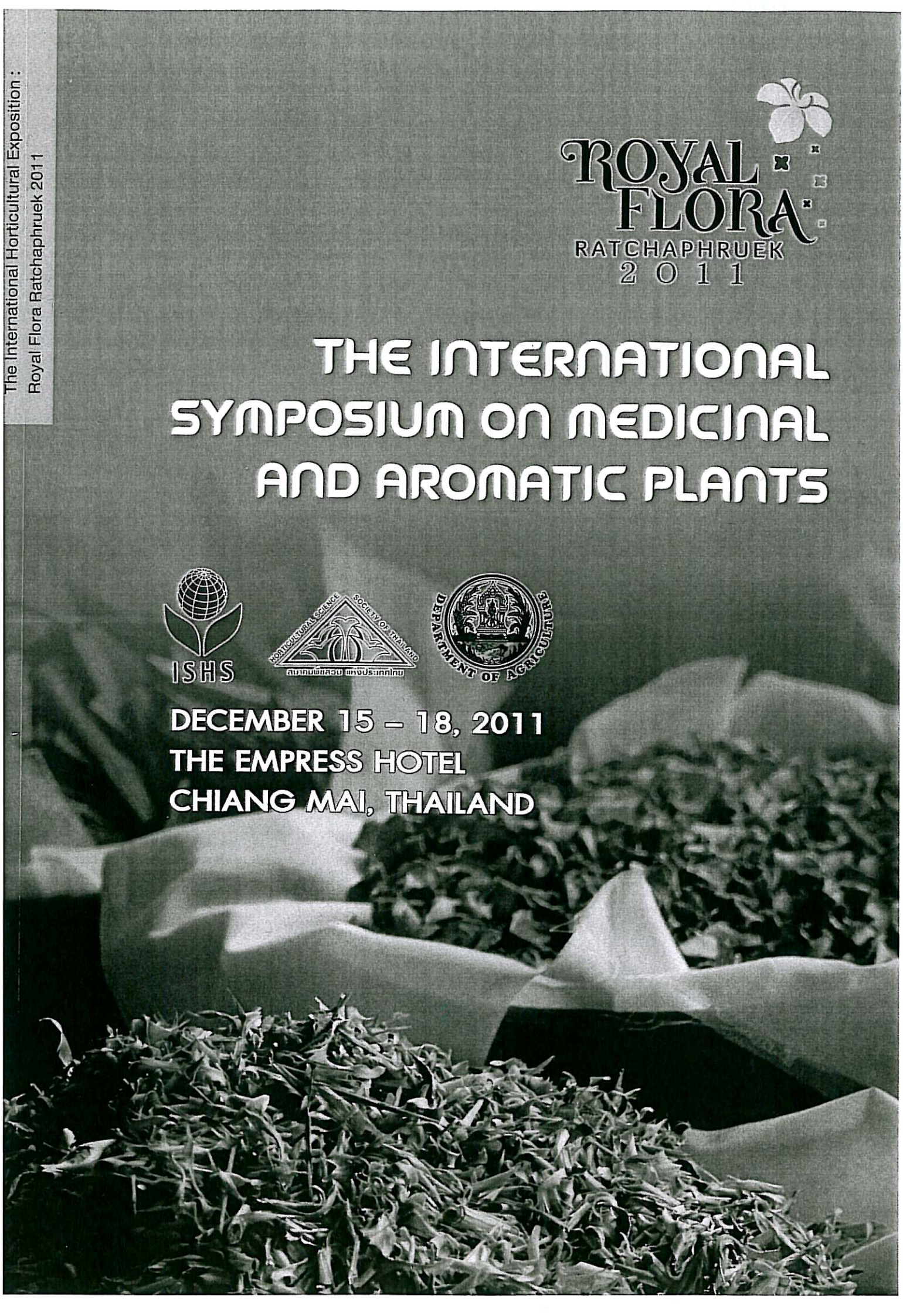

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